Claims

1. Multilayer microstructural device (1) comprising a first and a second layer (2a, 2b), which layers are aligned relative to each other by mating alignment structures (3a, 3b), **characterized in** that

the first layer (2a) is a positive replication of a microstructural master (10);

the second layer (2b) is a negative replication of the same microstructural master (10); and

that each pair of mating alignment structures (3a, 3b) originate from the same microstructural element (3a, 3b) on the master (10).

2. Multilayer microstructural device (1) according to claim 1, wherein the positive or the negative replication comprises microstructural elements other than the alignment structures.

3. Multilayer microstructural device (1) according to claim 1 or 2, wherein the microstructural master (10) comprises at least one deep microscale structure (3a, 3b, 4) and at least one shallow surface relief (7), which are aligned relative to each other by said mating alignment structures (3a, 3b).

4. Multilayer microstructural device (1) according to claim 3, wherein the deep microscale structure is a fiber aligning groove (4).

5. Multilayer microstructural device (1) according to claim 3, wherein the shallow surface relief is chosen among structures forming at least a part of a functional element chosen among a micro optical structure, a diffractive structure (7), a microfluidic structure, the substrate structure for the immobilization of compounds or particles, a microelectronic circuit, a micro mechanical structure or combinations thereof.

6. Process for the production of a multilayer microstructural device comprising a first and a second layer, said layers comprising at least one functional element and a structure for aligning a signal conductor in relation to said functional element (-s), which layers can be aligned relative to each other by mating alignment structures, comprising the following steps:

a) production of a master, comprising a large number of sections representing said first and second layers of said device;

b) formation of the desired functional elements and alignment microstructures, so that the master comprises both the structures for alignment of the layers, the signal conductor, as well as the functional element, aligned relative eachother with the available accuracy of the lithography step;

c) production of two copies of said master, the first copy having the same polarity as the master and the second copy having the opposite polarity;

d) production of first and second plastic discs, said discs carrying both layers of the multilayer device having alignment structures originating from the same master; and

e) dicing the discs into individual first and second layers of the multilayer device.

7. The process according to claim 6, wherein the silicon master is produced using lithographical methods, such as electron-beam lithography and/or photolithography.

8. The process according to claim 6, wherein the copies of step c are created by electroplating in metal.

9. The process according to claim 6, wherein the plastic discs of step d are created by injection moulding, or any other molding process, using the copies of step c as mould surfaces.

10. An intermediate product of the process according to claim 6, consiting of a thermoplastic disc carrying at lease one layer of a multilayer device having alignment structures originating from the same master.

11. A multilayer device obtainable through the process according to any one of claims 6 – 10.

12. A multilayer device having alignment structures originating from the same master and exhibiting an alignment accuracy of at least about ±5 μm.
